Variable Geometry Radiators Using Shape Memory Alloys

Completed Technology Project (2014 - 2016)

Project Introduction

This application proposes groundbreaking research performed under the NASA Space Technology Research Fellowship (NSTRF) Program. The proposed effort concerns the development of an innovative radiator concept that uses shape memory alloys (SMAs) to actuate passively in response to changes in its ambient thermal environment. In doing so, the radiator is capable of reconfiguring automatically to accommodate different thermal rejection requirements over the course of a mission. For example, during interplanetary travel, the radiator will be configured for minimal heat loss. When the spacecraft reaches a planetary surface, the radiator will automatically reconfigure itself to accommodate higher heat loads. In its Thermal Management Systems Roadmap, NASA emphasizes the importance of innovative radiator technology, citing it as "perhaps the most critical thermal technology development for future spacecraft and space-based systems (TA-14-17)." Indeed, such technology is critical for the future of space missions, as long-term crewed missions are difficult or impossible without it. The morphing SMA radiator concept in this application is truly revolutionary because it has the potential to improve several performance metrics simultaneously: mass, system complexity, reliability, and versatility. The details of the project proposal will be discussed further in the supporting documents of this application.

Anticipated Benefits

In its Thermal Management Systems Roadmap, NASA emphasizes the importance of innovative radiator technology, citing it as "perhaps the most critical thermal technology development for future spacecraft and space-based systems (TA-14-17)." Indeed, such technology is critical for the future of space missions, as long-term crewed missions are difficult or impossible without it. The morphing SMA radiator concept in this application is truly revolutionary because it has the potential to improve several performance metrics simultaneously: mass, system complexity, reliability, and versatility.

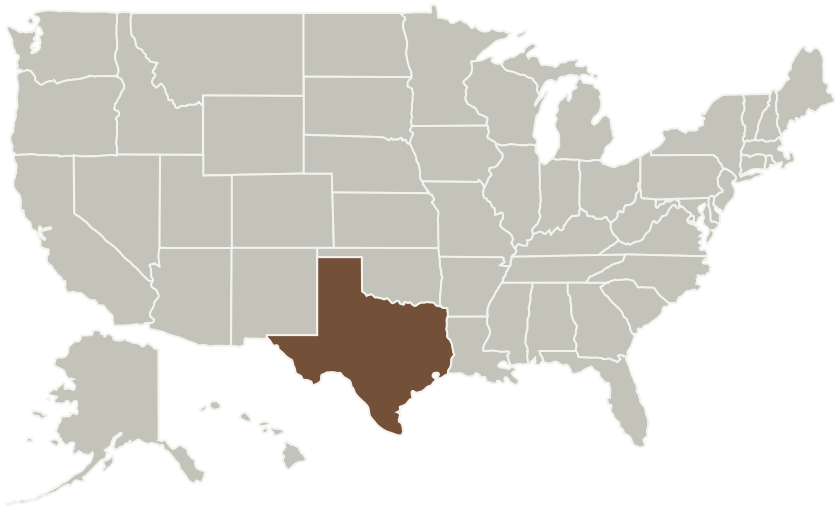
Variable Geometry Radiators Using Shape Memory Alloys

Table of Contents

Variable Geometry Radiators Using Shape Memory Alloys

Completed Technology Project (2014 - 2016)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Texas A & M University-College Station(Texas A&M)	Lead Organization	Academia Hispanic Serving Institutions (HSI)	College Station, Texas

Primary U.S. Work Locations
Texas

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Texas A & M University-College Station (Texas A&M)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

Darren Hartl

Co-Investigator:

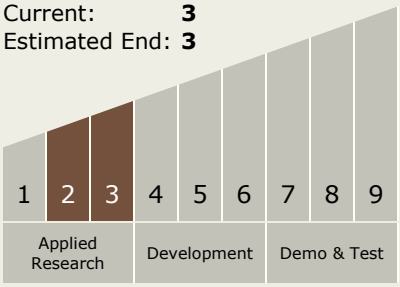
Christopher L Bertagne

Variable Geometry Radiators Using Shape Memory Alloys

Completed Technology Project (2014 - 2016)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage

Target Destination

Mars